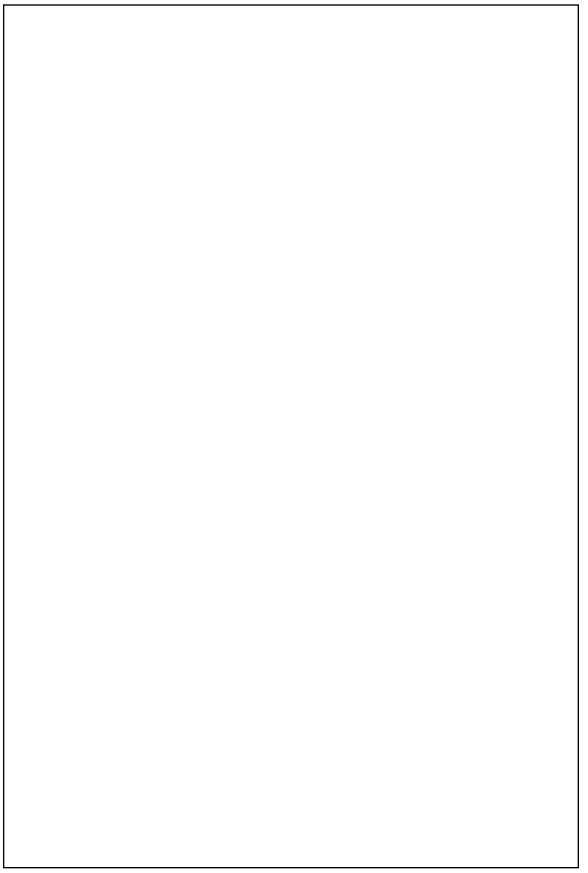
The Air Force at War



Seated, *left to right,* are William T. Y'Blood and Dr. Wayne Thompson. Standing at the *left* is Dr. Alan L. Gropman, panel moderator, with Dr. Richard G. Davis, *right*.

New Perspectives on the Combined Bomber Offensive: Results of a Statistical Analysis

Richard G. Davis

The Combined Bomber Offensive was a unique historical event. From September 1939 through May 1945 the four-engined bombers of the U.S. Army Air Forces, in 410,000 effective sorties, and the strategic bombers of the British Royal Air Force, in 300,000 effective sorties, each dropped over 1,000,000 tons of bombs on enemy targets in Europe, the Mediterranean, and North Africa.[1] Never again will fleets of massed heavy bombers using iron bombs make strategic or tactical attacks on enemy targets. So complex have modern aircraft become that, in constant procurement dollars, one B–2 bomber costs as much as 600 B–17s,[2] although the B–2 may make up that difference in personnel and support costs: three trained aircrew versus 6,000, and one hangar and ground staff versus 600. Not only cost, but the advent of nuclear weapons and precision guided munitions have lessened the requirement for large numbers of aircraft to deliver destructive force to the precise target. The air war in Europe has further generated several bomber loads of written material. The U.S. Eighth Air Force and its related interests alone inspired approximately 3,000 books and articles as of 1981,[3] with many hundreds, if not thousands of works occasioned by the fiftieth anniversary of World War II. Nonetheless, a reexamination of the original wartime records of both the RAF and the AAF, and their compilation into a homogeneous whole, has removed the detritus of over fifty years of revisionism and denial to reveal new perspectives concerning one of the most intriguing aspects of the Second World War.

The methodology of the research and compilation of the statistics of the Anglo-American strategic air war against the European Axis discussed here requires explanation. In the course of two decades of research the author encountered often annoying and sometimes major inconsistencies within and between the records of the two allied air services. Not only did the AAF and the RAF use different measurements, e.g., long versus short tons, but their methods of reporting operations, targets struck, and losses reflected greatly

different service perspectives. The necessity to evaluate both the overall allied strategic effort and the individual service contribution as consistently as possible required the compilation and reconciliation of each service's effective sorties (individual aircraft that actually attacked the target), losses, target nomenclature, method of bomb sighting, and the type of bombs employed. The task of compilation involved returning to the original daily, weekly, and monthly records prepared at the time of the operation by the bomber commands: RAF Bomber Command and 205 Group and the AAF Eighth, Ninth, Twelfth, and Fifteenth Air Forces. Only those immediate documents contained the targets and aiming points which the units were ordered or authorized to strike.

Revision of the records began as soon as the war ended, if not before. For instance, on May 31, 1945, less than four weeks after the German surrender, the U.S. Eighth Air Force headquarters completed a document entitled "Eighth Air Force Target Summary: Statistical Summary of All Bomber Attacks."[4] This work accounts for 268,000 effective heavy bomber sorties and lists not one of them as having been directed at a "city," or "town," or "village." Yet the mission records of the Eighth's three bombardment divisions, which directed the day-to-day bomber operations, list 259 attacks of nine or more aircraft on German and French city areas. The process of reconciliation of the records took place during and after their compilation when the compiler applied standardized tonnage figures and sighting and target terminology to the data. With that process complete, analysis of operations could be accomplished on the basis of comparing same to same rather than apples to oranges as had heretofore been the case.

During the course of research, compilation, and reconciliation, new insights into the nature of the Allied bomber offensive emerged. These fresh perspectives fell into three broad and sometimes overlapping categories: the possible effects of strategic bombing on Axis decisions and decision-makers; the actual conduct of bomber operations as opposed to wartime and postwar disputes and agendas; and the relationship of targets bombed to both strategic and target priorities and to technological limitations.

Before the outbreak of the Second World War both British and American strategic bombing doctrine stressed that the effect of bombing could go beyond physical destruction of enemy targets to affect the morale and the "will to resist" of the enemy's state and people[5] As French Marshal Ferdinand Foch, the supreme Allied military commander in 1918, suggested, the bombing of civilians might "impress the public opinion to a point of disarming the Government and thus becoming decisive."[6] It would logically follow that the more fragile the state and the less committed it and its people were to a war effort, the more susceptible it would be to the application of strategic bombing. Italy and the Balkan states formed the weakest links the Axis. Yet, Allied strategic air power as an instrument of military force acting alone failed to

reduce a single member of the Axis to the state of surrender.

The expectations of the prewar theorists were, of course, altogether too simplistic. Just as the attack on key enemy capabilities, such as oil and ball bearings, proved immensely difficult to mount and follow through on, so too did the attack on the enemy's will to resist. Authoritarian regimes, backed by internal security services of varying efficiency, held power in each of the Axis nations. These regimes, whether based on monarchy, dictatorship, oligarchy, class, party, or some combination of governance, sailed a course between Scylla and Charybdis. To continue the fight meant eventual destruction of their regimes by the Anglo-Americans or the Soviets. Of the two, the Anglo-Americans were preferable, being less prone to the ruthless physical elimination of their opponents and wholesale expropriation of private property. Even a new popularly based state would make significant decisions not in the interests of the current rulers, but abandoning the fight would bring immediate German overthrow of the regime and subject the nation (and its untrustworthy rulers) to the merciless rigors of a Nazi occupation. Given these circumstances, bombing, even to destruction, presented an alternative no worse than those already in the offing.

This is not to imply that bombing did not lower morale and productivity or that the Allies did not engage in strategic bombing for direct political and diplomatic objectives. In fact, more than has generally been realized, the record suggests that many individual raids, and even particular bombing campaigns, had both military and political objectives. Because of air power's inherent flexibility, which included an immediate response to critical situations and the unique capability to strike targets and populations not otherwise involved in combat, the Anglo-Americans seemed to have used strategic bombing as an exclamation point to emphasize or further political demands or expectations. The Allies directed the bulk of these raids against weaker Axis powers.

The strategic bombing of Italy illustrates the intertwining of military, psychological, and political aspects of Allied war-making. Many of Bomber Command's raids and the missions of the U.S. Ninth and Twelfth Air Forces against the marshaling yards of Rome on July 19 and August 13, 1943, may have had an impact on that nation's will to resist that went beyond the physical damage inflicted by the raids. After a break of thirteen months, Bomber Command resumed large raids over northern Italy on October 22, 1942. The raids were timed to distract Italian attention and lower morale before the beginning of Montgomery's counteroffensive at El Alamein and the Allied invasion of French North Africa. The raids continued until mid-December. Two days after the beginning of the Sicilian campaign, on the night of July 12, Bomber Command hit the city area of Turin with 900 tons of bombs. A military coup removed the Mussolini government on July 25, six days after the air raid on Rome, which killed 700 and wounded 1,600.[7] Italian King Victor

Emmanuel had approved the plotter's plans in part because of his reaction to the bombing of the capital. The new government of Pietro Badoglio began surrender negotiations with the Allies.[8] Two months earlier the senior American airman in the Mediterranean, Lt. Gen. Carl Spaatz, had stated, "We have ample evidence to clearly indicate that they [B–17 bombers] can blast their way through any defenses and destroy the will to fight in any nation which may oppose us."[9] On June 15, the day before the Allied Combined Chiefs of Staff authorized the raid on Rome, Spaatz further suggested bombing the marshaling yards of Naples and dropping surrender leaflets.[10]

On July 31 Eisenhower warned the Italians to surrender or face more bombing. Air Chief Marshal Sir Charles A. Portal, Chief of the RAF Staff, directed Air Chief Marshal Sir Arthur T. Harris, Commander of RAF Bomber Command, "to heat up the fire."[11] Between August 7/8 and August 16/17 Harris sent five large raids against Genoa, Turin, and Milan. On the night of August 12 Harris struck the city area of Milan with 1,400 tons. In Turin bombs damaged the Fiat factory, and the city suffered heavily. It had 40 percent of its fully built-up area destroyed or damaged and injury inflicted to the firms of Alfa Romeo, Isotto-Fraschini, Breda, and Pirelli.[12] Cultural objects had no immunity in these attacks. The La Scala opera house burnt and the refectory of the Church of Santa Maria delle Grazie was left with only one wall standing—the wall on which Leonardo da Vinci had painted the last supper.[13] But Badoglio continued to delay. For another tap on the shoulder the Allies sent the heavy bombers of the Twelfth Air Force to hit the Lorenzo marshaling yard at Rome on August 13. The next day the Italians declared Rome an open city, and on August 16 a representative of the Italian government arrived in Portugal to begin serious peace negotiations. He had departed with his instruction a day before the bombing. The sincerity of the offers convinced the Allies to cancel further attacks on northern Italy. The August 13 mission took the bombers away from another important target: the Axis forces evacuating Sicily. If the Italian surrender had gone as the Allies anticipated, the German forces and their heavy equipment that escaped from Sicily might have made little difference, but with the unexpectedly easy German occupation of Italy after the surrender, the failure to stop the evacuation would continue to plague the Allies for months to come.

Likewise, in the winter and spring of 1944 the nations of Bulgaria, Rumania, and Hungary began to waver. On January 10, 1944, 142 B–17s executed, under orders, a city area attack of 420 tons of high explosives on Sofia, the capital of Bulgaria. This raid, and three earlier ones by the Fifteenth in November and December 1943, caused the mass flight of the capital's population and the movement of the seat of the Bulgarian government to a safer location.[14] These attacks, which the Allies repeated in subsequent months, apparently aimed to force the Bulgarian Council of Regents[15] to the peace table. On February 16 the British Joint Intelligence Committee advised the

Mediterranean theater commander, Gen. Maitland Wilson, that the Allies had received "a number of Bulgarian offers of surrender" and "approaches from Roumania," and that "there are abundant signs that the Hungarian Government is seriously concerned at the bombing of Sofia and Helsinki." Although uncertain as to the genuineness of these initiatives, the committee recommended to Wilson that the Mediterranean Allied Air Forces (MAAF) bomb the Bulgarian towns of Plovdiv (a communications center), Burgas (transit port for German imports of Turkish chrome), and Varna (a German navy and sea transport base) for both political and economic reasons until the Bulgarians made "an authoritative approach." The committee further advised the bombing of Bucharest and Budapest in order to produce "panic and administrative confusion." The committee added, "It is important that the first bombing [of Budapest] should be effective and perhaps for that reason Anglo-American bombing should precede Russian."[16] On March 22, Wilson, taking cognizance of this information and of the results of the Soviet winter offensive, which had heavily weakened the German southern front, asked the Fifteenth to move in the greatest possible strength against marshaling yards in Bucharest, Ploesti, Sofia, and other suitable Bulgarian and Rumanian targets. However, Wilson placed Budapest on the restricted list. Although Spaatz appealed to both Eisenhower and Arnold, he failed to get these decisions reversed. The Hungarian decision particularly baffled him, until he found that His Majesty's government had contacted pro-Allied elements in the country and hoped to take it out of the war. Instead, a German-sponsored coup put Hungary firmly under Nazi control; the Allies then removed any bombing restrictions on Hungary.[17] Four hundred and fifty of the Fifteenth's heavy bombers hit a Budapest marshaling yard and an armaments work in a built-up area of the city on April 3.

Within the context of these events, 205 Group and the Fifteenth Air Force attacked Bulgarian targets during March. On the night of March 15/16, 205 Group attacked the Sofia marshaling yard. The next night 205 Group returned to the same aiming point. Two nights later 205 Group struck the marshaling yards at Plovdiv. On the night of March 29/30, the British attacked Sofia once more, dropping 149 tons. The next day it was the Americans' turn to hit Sofia. A total of 246 bombers attacked the marshaling yards; 88 bombers, under orders, attacked the center of the city, and 32 bombers hit the city's industrial area. In all they dropped 1,070 tons of bombs (including 278 tons of incendiaries, the second highest total of this type of bomb ever dropped by the Fifteenth in a single raid). In terms of the Fifteenth's total wartime operational pattern, this late March bombing was clearly a city area raid. One source reported that it caused a fire storm.[18] Given the inaccuracy of the Allied bombing and the fact that neither 205 Group nor the Fifteenth had yet received electronic aids, the residents and bureaucrats of Sofia had again been touched by the war.

As for Rumania, both the Antonescu government and the opposition

made peace overtures, especially after the Red Army fought its way into Rumanian territory on April 1, 1944. The Anglo-Americans emphasized the Rumanian's predicament on April 4, when 313 of the Fifteenth's heavy bombers dropped 866 tons of high explosives (no incendiaries) on Bucharest marshaling yards; on April 15, when 257 heavies using radar and dead reckoning dropped 598 tons of high explosives on the Bucharest city area; and on April 24, when 209 bombers hit Bucharest with 477 tons. By late April the western Allies and the opposition had agreed to terms (also approved by the Soviets in June), but the opposition leader, a man known for his indecisiveness, procrastinated. On April 29, 1944, an exasperated Churchill received a report from Foreign Minister Anthony Eden that described the Rumanian delays and excuses. The Prime Minister's reply, written at a time when he was delaying pre-Normandy air operations out of concern for French civilian casualties, revealed an all too human capacity to hold two contradictory thoughts at the same time. He noted, "It is surely a case of more bombing."[19] 205 Group sent night raids to Bucharest on May 3, 6, and 7. But the Fifteenth dealt the heaviest blows. On May 5, 550 bombers hit Ploesti. On May 6, over 667 bombers assailed rail yards and aircraft plants in 5 different Rumanian cities. And on May 7, 481 heavy bombers dropped 1,168 tons (including 164 tons of incendiaries) on rail yards in Bucharest. These attacks had the military purposes of denying the Germans oil, snarling communication with the Eastern Front, and adding to the burden on the rails imposed by the Danubian mining campaign. Given Churchill's pique, the Allies also intended the bombing as a reminder of the consequences of continued delay. Unfortunately the Bucharest raid of May 7 partially missed its intended target and struck a crowded industrial slum. According to Lt. Gen. Ira C. Eaker, Commander, MAAF, this attack killed 12,000 civilians.[20] The Rumanians continued with the Axis until late August. Ultimately, as with the Bulgarians, they delayed until too late to make an agreement with the western Allies. They also ended up in the belly of the Soviet wolf.

The bombings of Bucharest and other Balkan capitals do not seem to have produced significant political results. Given the weak morale of the Balkan nations' leadership and populations, they would appear to have been excellent candidates for the prewar air theories that advanced the principle that strategic bombing could panic a state's leadership into surrender. Evidence from wartime operations indicates that air theorists tended to emphasize the potency and potential of air power without adequate consideration of the entire spectrum of diplomatic and military factors involved in warfare. On the other hand, the psychological effects of strategic bombing defy exact measurement. The Balkan bombings may well have contributed to defeatism and a desire for limited commitments with their German partners.

New perspectives on strategic bomber operations derive from comparison of data generated by the electronic spreadsheet. This tremendous analyti-

cal tool enabled the author to take a fresh look at one of the enduring controversies of the era—the contribution of Harris and Bomber Command to the Anglo-American campaign against German oil, a system whose destruction meant the end of effective German military operations. In the following discussion, only the efforts of the U.S. Eighth Air Force and Bomber Command are compared. Both had access to the same targets, encountered the same weather conditions, and responded to the needs of the same ground forces. The U.S. Fifteenth Air Force is not included because it attacked different targets under much different circumstances. Lt. Gen. Nathan F. Twining, commander of the Fifteenth, based his decisions on whether to attack oil targets during a specific period on very different criteria than those used by Harris and Spaatz. There is no question that Spaatz and Lt. Gen. James H. Doolittle, Commander, Eighth Air Force, treated oil as the primary strategic target from May 12, 1944, the date of the first systematic American attack on German synthetic oil, to the end of the war. But Harris' commitment to oil bombing, especially when it competed with his city area campaign, was questioned during the war by his service chief, Portal, and afterward by numerous critics, all of whom contend he could have done far more against the oil target system. One of Harris' most severe critics, historian Max Hastings, stated the charge most clearly:

> But having made allowances for all these elements, there were still many mornings when Harris sat at his desk confronted with a long list of targets of every kind, together with a weather forecast that—as usual throughout the war—made the C-in-C's decision a matter of the most open judgment. And again and again, Harris came down in favor of attacking a city rather than an oil plant.[21]

Although the statistical record cannot address Harris' reasoning for the selection of targets bombed, it does show what he actually bombed. From June 1, 1944, to May 8, 1945, Bomber Command devoted 15 percent of its total sorties, 22,000 of 155,000, against oil targets, dropping 99,500 tons. Both these figures exceeded those of the Eighth Air Force, which devoted 13 percent of its effective sorties, 28,000 of 220,000, and dropped 73,000 tons of bombs on oil targets from May 12, 1944, to May 8, 1945. Obversely, Harris devoted 36 percent of his efforts over the same period to area bombing, while Doolittle employed his forces on area or area-like raids only 16 percent of the time throughout the last year of the war. In spite of the fact that Bomber Command actually devoted more energy to oil bombing than the Eighth did, could it have done more, and as critics imply, was Harris deliberately disobeying his directives?

In June and July 1944 the German night fighters were still a force to be reckoned with. In June Harris sent only four main force raids into Germany, all against oil targets in the Ruhr, and suffered a loss of 10 percent. In July he

sent ten main force raids into Germany, including five oil raids against the Ruhr. City area heavy bomber sorties doubled those against oil. The Eighth surpassed these efforts by only 150 tons in June and by 1,750 tons in July. By that time German synthetic oil production had fallen precipitously. The Eighth's initial bombing in May dropped production from 380,000 tons per month to 200,000 tons. In the next two months production dropped to approximately 70,000. In August Harris dispatched ten heavy bomber raids against oil, five of them to French storage facilities, and ten area raids into Germany. He sent the first major RAF daylight heavy bomber raid of the war, 220 aircraft against oil targets in Homberg. At this stage of the war Bomber Command was more accurate by day than the Americans were. In September Bomber Command made nine more 300-ton or larger daylight raids on oil targets in Germany, but it devoted three times that effort, including three day raids, to area bombing. In August Bomber Command dropped 1,400 more tons of bombs on oil targets than the Eighth did; it fell behind the Eighth by 3,100 tons in September. In October Harris sent six major daylight raids against oil, but he devoted twelve times that effort, including eight major day raids, to area bombing. Of the eleven daylight area raids of September and October, at least five, comprising 1,650 sorties, employed visual sighting. One of those, on Kleve, was at the request of the Allied ground forces. The other four could probably have been sent against oil targets. On two of the days in question, Bomber Command conducted separate day raids on both city area and oil targets.

One should realize that RAF daylight precision techniques landed a far higher percentage of bombs on or near the aiming point than RAF night raids did. This is a key point. Not only did Harris dispatch day raids against oil, his missions usually numbered 150 or fewer bombers. This maximized accuracy in that if one sent more than 150 aircraft to attack the same point, bombing accuracy of the excess aircraft was severely degraded by the preceding unit's smoke and damage, not to mention the extra time given to German antiaircraft artillery to get the range. Harris bombed up to the point of diminishing returns, and no further, thereby making the most efficient use of his resources although he may not have obeyed the spirit of his directive. On November 1 the Air Staff emphatically ordered Harris to concentrate on oil. He openly disagreed with the orders but carried them out, sending thirteen raids. The weather was so bad that none of Harris' four night oil raids and only two of his nine daylight raids used visual sighting. In November only five of forty of the Eighth's major oil raids used visual sighting. Bad weather made it necessary to employ area techniques, but thousands of bombs drenching a target area probably did not ensure that as many bombs actually hit the oil targets as would have had far fewer bombs been dropped visually during daylight. Every month before November 1944 the Eighth's percentage of sorties devoted to oil exceeded that of Bomber Command's by 25 to 50 percent. In November the two air forces

devoted an equal percentage of resources, and from December until war's end, Bomber Command's percentage of effort more than doubled that of the Eighth's. It would appear that Harris fulfilled his directives, including the British city area policy which remained in force, albeit at a lower priority, throughout the period. Harris justified his effort on the basis of weather conditions and tactical considerations. Overall it can be said that American bombs ruined the oil industry, and that British *and* American bombs flattened it and kept it flattened.

The Combined Bomber Offensive database also supplies insight into one of the most complex and perplexing problems concerning Anglo-American operations, the question of city area bombing. For Bomber Command, which had a series of War Cabinet–approved directives authorizing the practice, the question revolves around the extent of its efforts and their necessity. This paper will not address the moral aspects of the necessity. However, it must be acknowledged that throughout the conflict weather and technological limitations on accuracy made area bombing a tactical imperative for both the British and the Americans. From January 1942 onward Bomber Command spent 56 percent of its sorties on city area bombing. When one subtracts the night harassing raids of Mosquitoes, Bomber Command expended 50 percent of all its heavy bomber sorties, almost 500,000 tons, on area bombing.

The composite figure masked variations over time. For example, from April 1943 through March 1944, when Harris finished the Battle of the Ruhr and fought the Battles of Hamburg and Berlin, Bomber Command released 40 percent of all its city area tonnage, which accounted for 87 percent of its total tonnage for the period. The percentage of city area tonnage declined during the pre-D-Day and Normandy campaigns, reaching an all-time low of 3 percent in June of 1944, and most of that area tonnage was on French cities at the direct order of Eisenhower. From December 1944 until the end of the war, the Command dropped 50 percent of its entire city area tonnage. That effort amounted to 46 percent of its entire tonnage for the period. Those are the figures. They should serve as a baseline for any further discussion.

For Americans the question is not only how much, but whether it occurred at all. As mentioned above, at least one major report of the Eighth Air Force prepared immediately after the war eliminated all reference to "city" bombing. However, individual mission reports prepared shortly after execution of the operations present a somewhat different story. They state that the Eighth expended 12.5 percent of its total tonnage, 85,100 tons, in city bombing. Of that total, 72,000 tons were in 117 command bombings of Germany, bombings either expressly ordered or authorized by Eighth Air Force headquarters. Such orders to the combat units either expressly designated the center of the city as the target or authorized the bombing of the center of the city by radar as a specified secondary target if the visual primary target, such as a tank plant, was clouded over. Another 10,100 tons were dropped in 159 oppor-

tunity raids over Germany. With the permission and encouragement of official policy, small units separated from their main formations or from those unable to bomb their primary and secondary targets and sought out cities, towns, or villages of opportunity to bomb. A final 3,000 tons landed on 21 French villages and towns near the Normandy landings in a series of attacks expressly ordered by Eisenhower. The records of the Fifteenth Air Force, which fought a much different war, acknowledged only 10,700 tons of city bombing, 3 percent of its total tonnage. Some 2,000 of those tons fell on Yugoslav towns designated and specifically requested by Marshal Tito's forces as containing "enemy" garrisons.

The Eighth did not begin city bombings until September 27, 1943, with a mission against the port of Emden. It was no coincidence that the raid was the first operational use of radar by American bombers. In the 103 previous missions, in which weather en route or over the target substantially interfered with 20 missions, the Eighth attempted to strike its targets with daylight precision techniques. Some criticize this effort as a Pavlovian adherence to outmoded doctrine. It may have been, but the Eighth had no alternative. The Norden and Sperry bombsights that equipped its B–17s and B–24s could not see through clouds, and no alternative sighting method was available until the advent of airborne radar. To resort to area bombing made no sense. Such limitations promoted the selection of precision targets, even if accuracy in practice may have left something to be desired. The advent of radar changed all that. The Eighth could now strike targets through overcast, as long as it could take off and land at its bases. Now, the rate of operations and the number of bombs delivered to enemy territory greatly increased, but at a price. The most common American radar, the H2X, a variant of Bomber Command's H2S, could identify coastal cities or cities with a distinctive river running through them because the images presented by ground and water contrasted markedly. H2X could also identify a city or built-up area, but over a large city the radar tended to fuzz up with the clutter of too many varied returns. In the hands of an ordinary operator, it could not usually identify specific targets, such as marshaling yards or arms plants, within a city. Acknowledging these limitations, raids dispatched in the expectation of encountering clouds over the target were authorized to do what they were going to do in any case—drop their bombs on the city if they couldn't see the target. Because of the dangers associated with bringing back bombs, bomber crews seldom did so. H2X could not locate small targets, such as synthetic oil plants, which meant that the few days of visual bombing available for nine months of the year were reserved for them. After September 26, 1943, the Eighth flew 256,500 effective combat bomber sorties; 48 percent of them (124,000) used some form of radar-assisted bombing. Twenty-three percent of those sorties were city area strikes. On October 10, 1944, the Eighth ordered its first visual area raid, when 138 bombers attacked Münster. It would have been especially ironic four days latter if the

second Schweinfurt mission had arrived over its target and encountered clouds, instead of fair weather. The Eighth ordered it to bomb the city area of Schweinfurt as a secondary target if overcast obscured the ball bearing plants. Instead of the gallant Air Force equivalent of Pickett's Charge, that famous raid might have gone into the books as something else entirely.

On July 21, 1944, a date on which six separate groups of the Eighth's bombers totaling 312 aircraft attacked cities visually as targets of opportunity, Spaatz' Deputy for Operations, Maj. Gen. Frederick L. Anderson, sent a new bombing policy memo to Doolittle and Twining. Anderson pointed to Spaatz' oft-reiterated and continuing intention to bomb precision targets, and he categorically denied any intention to area-bomb. But having denied the intention, he proceeded to authorize the practice: "We will conduct bombing attacks through the overcast where it is impossible to get precision targets. Such attacks will include German marshaling yards whether or not they are located in German cities."[22] This memo had a chilling effect on the area bombing that was reported. Three-quarters of all reported raids appeared in the Eighth's records before this memo. However, using the profile of known command city raids—those consisting of more than 100 aircraft that nearly always carried more than 20 percent incendiaries and bombed by radar over 80 percent of the time—and applying it to all Eighth Air Force raids, the database indicates 64 more "area-like raids." Fifty-five, or 85 percent, of those raids occurred after Anderson's memo. The addition of area-like raids and their 60,750 tons of ordnance increased the total of the Eighth's city area and area-like raids to 21.5 percent of its total effort.

The Eighth conducted several unusual and little-understood missions during February 1945. On February 3 it executed the Thunderclap Plan over Berlin, where 933 B–17s conducted the Eighth's largest visual city area raid. The mission intentionally struck the governmental center of the city to produce confusion and perhaps finally break the will of the German government and force its surrender. On February 21 the Eighth flew its largest raid of the war against a single target when all three air divisions, 1,198 heavy bombers strong, used H2X to attack the main marshaling yard of Nuremberg. They dumped 2,869 tons (41 percent incendiaries) on the key transportation center and symbolically important city. The next day all Anglo-American air power (Bomber Command, British 2d Tactical Air Force, and the U.S. Eighth, Ninth, Twelfth, and Fifteenth Air Forces) joined in Operation Clarion. The Americans did not intend to kill German civilians as much as they hoped to damage the Germans' psyches. Supreme Headquarters Allied Expeditionary Force's (SHAEF's) proposed psychological war plan to accompany Clarion aimed to impress upon the German people, especially train crews and yard workers, the necessity of avoiding railway stations, tracks, freight yards, and so on.[23] Shortly before initiating the operation, and after the American press furor over Dresden, Spaatz issued specific instructions:

> In planning for Operation Clarion it is important that Public Relations and Communiqué Officers be advised to state clearly in communiqués and all press releases the military nature of all targets attacked. Special care should be taken against giving any impression that this operation is aimed at civilian population or intended to terrorize them. In addition to the above, care must taken to insure that all crews are thoroughly briefed that attacks will be limited to military objectives. This is extremely important for the safety of our crews in case they should be shot down in enemy territory.[24]

By attacking numerous unbombed targets near small cities and towns, the Allies hoped to impress upon millions of Germans their helplessness in the face of Allied air superiority. British and American fighters and bombers would spread out all over Germany, blasting transport targets such as grade crossings, stations, barges, docks, signals, tracks, bridges, and marshaling yards. The plan purposefully selected targets near small towns heretofore untouched by the war and therefore not likely to have strong antiaircraft defenses. To heighten their accuracy, the Eighth's and Fifteenth's heavy bombers came in at unusually low altitudes. Some of them bombed from 6,000 feet, while the Ninth's medium bombers buzzed up and down the rail lines, destroying locomotives and disrupting traffic. British 2d Tactical Air Force joined in the operations with over 1,600 sorties, and Bomber Command made four attacks. In Italy British 1st Tactical Air Force and the American Twelfth also joined in. In all, more than 3,500 heavy bombers and 4,900 fighters participated. The bombers attacked 219 transportation targets while the fighters destroyed or damaged 594 locomotives and 3,803 rail cars.[25] The Allies lost 90 aircraft. Of the Eighth's 13 fighter groups, 11 strafed targets of opportunity.

The bombing itself proved remarkably accurate. The combination of lower altitude and smaller attacking formations produced good results. Ninety-six of the Eighth's 124 attacking squadrons bombed visually, and the Air Force's Operational Analysis Section plotted 76 of those bomb patterns and compared them to the average of operations from September 1, 1944, through January 31, 1945. In Clarion the bomb patterns were considerably more compact with only one-third as many gross errors (8 percent to 28 percent). In addition 26 percent of Clarion's visually aimed bombs fell within 500 feet of the aiming point and 82 percent fell within 2,000 feet, as opposed to the winter's average of 12 percent within 500 feet and only 57 percent with in 2,000 feet.[26] Relatively few bombs fell on populated areas, and for its entire effort the Eighth loaded less than 0.2 percent incendiary bombs. The Fifteenth chipped in with 48 squadron or smaller-sized attacks on rail targets in Germany, Austria, and Italy, while the medium bombers of the Ninth Air Force

dropped 850 tons on 11 marshaling yards and 44 other rail targets. Fighter-bombers from the Ninth's three tactical air commands hit rail targets with an additional 376 tons and conducted armed reconnaissance along tracks from Düsseldorf to Giessen.

Any consideration of Eighth Air Force city area attacks in general and its particular operations in February 1945 must address one of the chief charges on its blotter: the Dresden raid of February 14, 1945. The Eighth and I, myself, have defended this raid as a typical marshaling yard attack. Three hundred and thirty-one B–17s of the Eighth's 1st Air Division, carrying 771 tons of bombs, 40 percent of them incendiaries, attacked the already pulverized city's Friedrichshafen marshaling yard and encountered at least 20 percent overcast, which forced two-thirds of the force to resort to radar bombing. Given the usual bomb dispersal in such circumstances, bombs scattered all about the center of the city. The Eighth's supposed intention made it, at worst, an area-like raid.

However, it was not a marshaling yard attack or even an area-like attack. The orders issued by the 1st Division to its bombers clearly defined the mission objectives:

Primary Target	Visual—Center of built up area DRESDEN.
Secondary Targets	Visual—M/Y Chemnitz. H2X—Center of Dresden.
Last Resort	Any military objective positively identified as being in Germany and east of the current bomb line.[27]

The 281 P–51s escorting the 1st Air Division had permission "to strafe rail and road transportation on withdrawal if no enemy aircraft had been encountered."[28] The bomb plot photograph accompanying the 1st Division's after action report clearly pictures the aiming point as the center of the city, although one group's bombs landed squarely on the marshaling yard. Other units of the 1st Air Division lost their way and failed to reach Dresden. But in their zeal to complete the mission they misidentified several Czech cities as their targets. Sixty B–17s dropped 153 tons into the center of Prague, while 25 attacked the city of Brux and 12 struck the city of Pilsen. Bombers of the 3d Air Division also wandered into Czechoslovakia. Thirty-eight of its B–17s attacked the town of Eger, and 24 more hit the town of Tachau. In all, the Eighth dropped 397 tons on Czech territory. The 2d and 3d Air Divisions had orders to attack marshaling yards, with no mention of city areas. They made area-like attacks that day. The 2d hit the Buckau marshaling yard at Magdeburg with 333 B–24s carrying 799 tons (31 percent incendiaries), and the 3d struck the Chemnitz marshaling yard with 306 B–17s carrying 747 tons

(27 percent incendiaries). Both attacks used radar-assisted sighting. The next day 211 of the 1st Air Division's B–17s, after finding their primary target, a synthetic oil plant covered with clouds, released an additional 465 tons of high explosives through complete overcast on Dresden. They reported their target as "military installations," a designation that all of the hundreds of Eighth and Fifteenth Air Force missions over Germany never used. No longer can there be any doubt that the U.S. Army Air Forces purposefully bombed the city area of Dresden.

Taken as whole, many of February's strategic bombing operations were conducted with the seeming purpose of breaking the German will to resist. Like strategic operations in the Gulf War more than forty years later, they illustrated the difficulty, if not impossibility, of bringing down a police state with bombing alone.

In conclusion, one can see that the Combined Bomber Offensive database offers a valuable new tool for the analysis of air operations. In this paper I have not shared all that I have discovered, nor do I claim to have developed more than a small fraction of the possible new perspectives that might come from my compilation. Therefore, the database can be made available to those who request it, and presumably other historians will also shed new light on the Combined Bomber Offensive.

Notes

1. Richard G. Davis, draft manuscript, "The Combined Bomber Offensive: A Statistical History," May 1997. As of this writing, May 1997, the manuscript consists of an electronic spreadsheet (Excel 7.0 for Windows95) containing the bombing data (approximately 500 sheets of paper printout or 4 megabytes of data) plus a narrative of 250 pages, a statement of methodology, and a detailed and annotated key to the spreadsheet.

2. This calculation is based on Table F–4: "USAF Weighted Inflation Indices Based on Inflation and Outlay Rates," USAF "Statistical Digest, FY 1993," prepared by the Deputy Assistant Secretary (Cost and Economics) and Assistant Secretary (Financial Management and Comptroller) of the Air Force, Washington, D.C., Nov 1, 1994, p. F–127. The procurement cost of a B–2 ($1,000,000,000 1993 dollars adjusted [multiplied by 0.158] to constant 1949 dollars), $158,000,000, is divided by the cost of a B–17, $250,000, in constant 1949 dollars. The actual average cost of all B–17s procured from 1937 to 1945 in then-year dollars would probably make this comparison even more unfavorable to the B–2.

3. Kenneth P. Werrill, *Eighth Air Force Bibliography: An Extended Essay and Listing of Published and Unpublished Materials* (Manhattan, Kans.: Aerospace Historian/Eighth Air Force Historical Society, 1981), lists 2,794 separate items.

4. "Eighth Air Force Target Summary: Statistical Summary of All Bomber Attacks, Alphabetically by Location, Period 17 Aug. 1942 Thru 8 May, 1945," date of security classification stamp, 5/31/45, USAF Historical Research Center, Maxwell AFB, Ala., File No. 520.308.

5. For the opinion of the Air Corps Tactical School, the font of U.S. strategic air doctrine, see the memoirs of one of its instructors and theoreticians, Haywood S. Hansell, Jr., *The Strategic Air War Against Germany and Japan: A Memoir* (Washington, D.C.: Office

of Air Force History, GPO, 1986), pp. 7–14. RAF thinking on this subject has been well documented. See the official history, Sir Charles Webster and Noble Frankland, *The Strategic Air Offensive Against Germany, 1939–1945*, Vol. I, *Preparation Parts 1, 2 and 3* (London: HMSO, 1961), pp. 50–64. Hansell is quite explicit in stating that U.S. doctrine provided for attacks against both the enemy's capacity to resist and his will to resist. RAF thinking was somewhat less clear. The Chief of the Air Staff, Air Chief Marshal Sir Hugh Trenchard, advocated bombing military targets, but he assumed that the concomitant destruction of civilian lives and property would have a telling affect on the will to resist.

6. Webster and Frankland, *The Strategic Air Offensive*, Vol. I, p. 64.

7. C.J.C. Molony, F.C. Flynn, H.L. Davies, and T.P. Gleave, *The Mediterranean and the Middle East*, Vol. V, *The Campaign in Sicily 1943 and the Campaign in Italy, 3rd September 1943 to 31st March 1944* (London: HMSO, 1973), p. 172.

8. Albert N. Garland and Howard McGaw Smyth, *Sicily and the Surrender of Italy* United States Army in World War II: The Mediterranean Theater of Operations (Washington, D.C.: Center of Military History, GPO, 1965), p. 266.

9. Ltr, Spaatz to Lyle G. Wilson, May 8, 1943, U.S. Library of Congress, Manuscript Division, Washington, D.C. (LOC/MD), The Papers of Carl A. Spaatz, Diary File.

10. Command Diary Entry, Jun 14, 1943, Spaatz Papers, Diary File.

11. Air Historical Branch, British Air Ministry, "The Bombing Offensive," Vol. V, p. 93.

12. *Ibid*., pp. 95–96.

13. Denis Richards, *The Hardest Victory: RAF Bomber Command in the Second World War (New York: Norton, 1995)*, p. 196.

14. Msg PZ 861, from the Air Ministry from the [British] Joint Intelligence Committee (JIC) to Freedom [Allied CinC Mediterranean], Feb 16, 1944, AF/HSO microfilm reel A6068.

15. The death in August 1943 of the 49-year old King Boris, an able if somewhat slippery ruler and politician, forced a regency. The regents had neither the skill or courage of King Boris. Though pro-Western, they dithered until the Red Army crossed their border and lost all.

16. Msg PZ 861, Feb 16, 1944.

17. Davis, *Spaatz*, pp. 386–387.

18. Ronald Schaffer, *Wings of Judgement: American Bombing in World War II* (New York, N.Y.: Oxford University Press, 1985), p. 56.

19. Minute, [Churchill] to Anthony Eden, Apr 29, 1944, Public Records Office, Kew, United Kingdom, Records of the Foreign Office, FO 371/43999/R 6819.

20. Ltr, Ira C. Eaker to H.H. Arnold, September 17, 1944, LOC/MD, The Papers of Henry H. Arnold, Folder "Letters to General Marshall," Box 44. Arnold also sent a copy to the President (see Box 45, Folder, "Letters to FDR").

21. Max Hastings, *Bomber Command* (New York: Dial Press, 1979), pp. 388–389.

22. Memo, Anderson to Director of Operations, Jul 21, 1944, Spaatz Papers, Subject File 1929–1945.

23. Memo to CG, USSTAF, from Gen. Robert A. McClure, Chief, Psychological Warfare Division, SHAEF, Subj: Psychological Warfare Operations in Connection with Clarion, Jan 16, 1945, AF/HSO microfilm frame 637.

24. Msg F–6055Al (USSTAF MAIN IN 20170), CG, Ninth Air Force to USSTAF, AF/HSO microfilm reel A5616, frame 93. This message cites Spaatz' message in full. I have not yet been able to locate a copy of the original.

25. "Summary of Clarion," Spaatz Papers, Diary.

26. Rprt, Eighth Air Force Operations Analysis Section, subj: "Report on Attacks against Enemy Rail Communications—22 February 1945," Mar 8, 1945, AF/HSO microfilm reel A5923, frame 48.

27. Rprt, HQ 1st Air Division, subj: "Report of Operations, Dresden 14 February 1945," Feb 25, 1945, AF/HSO microfilm reel B5018, frame 642.

28. Tactical Command Rprt, Field Order 1622A, Feb 14, 1945, from Col Fred C. Grey, Director of Fighters, AF/HSO microfilm reel B5018, frame 688.

Command and Control of Air Operations: A Chimera of the Korean War

William T. Y'Blood

From the time the airplane was first used as a military weapon, the issue of who commands it and how it is controlled has been an elusive chimera, a mirage tantalizingly close but always fading from the grasp of those seeking the authority. Among its several meanings, *chimera* is also defined as a monster. Perhaps mirage and monster go hand-in-hand, depending on one's perspective concerning command and control (C^2).

As recently as the Gulf War C^2 remained a problem. It is an amorphous term that can mean many things to many people, too often used at cross-purposes. Over the years C^2 terminology has grown to encompass not only command and control, but communications, computers, intelligence, and the like. One wit even proposed "$C^{27}E$—command, control, communications, computers, cohesion, counterintelligence, cryptanalysis, conformance, collaboration, conceptualization, correspondence, camaraderie, commissaries, camouflage, calculators, cannon, caissons, canteens, canoes, catapults, carpetbaggers, caddies, carabineers, carrier pigeons, corn whiskey, camp followers, calamine lotion, etc."[1]

Fortunately, Lt. Gen. George E. Stratemeyer, the Far East Air Forces (FEAF) commander during the first year of the Korean War, and his successor Lt. Gen. Otto P. Weyland did not have to deal with $C^{27}E$. They did, however, have to contend with C^2, and their experiences during the Korean War were not particularly happy. Many of their problems related to targeting and a rather vague concept known as "coordination control."

The stormy squabbles over roles and missions, the result of severe budget cuts by the Truman administration and publicly exemplified by the B–36/supercarrier controversy of 1948–1949, left a bitter residue that could still be tasted during the Korean War. Distrust of another service's motives tainted many decisions. Competing interservice doctrines tended to fuel the fires started by these quarrels.

The Air Force viewed an air campaign as one distinct from other operations. Therefore, the Air Force maintained, one commander (usually an Air

Force officer) would plan and direct an air campaign no matter where the air assets came from. Tactical air operations should never come under ground or naval control, but would be responsible to the theater commander. Naturally, the tactical air commander would be best situated to allocate resources for the missions in the theater.[2]

Inevitably the Navy and Marine Corps disagreed with the Air Force. To the Navy, naval air operations were integral parts of overall naval operations, and naval air should never be confined to a specific operational area, which would nullify its major strength—mobility. The Navy, however, agreed with the Air Force on a couple of points. Naval air assets should not come under a ground or air commander, nor should air or ground commanders decide how much support to provide or when to provide it.[3]

The Marine Corps was the most adamant about the use of its own aircraft. More than in the other services, aviation was seen as an integral part of the Corps. Marine aviation existed to serve ground components, especially because marines lacked strong artillery support and therefore had to rely heavily on aviation. Using Marine Corps air assets elsewhere left marines in combat highly vulnerable.[4]

Generals Stratemeyer and Weyland had to contend with these conflicting interservice views during the war. They were also hampered by the pernicious influence of Maj. Gen. Edward M. Almond, MacArthur's chief of staff and commander of the X Corps. Almond (who, by the way, was a student at the Air Corps Tactical School in 1938–1939) was an especially arrogant and abrasive individual not particularly well liked or respected outside his own close-knit coterie of staffers. Unfortunately, he believed he knew more about close air support than any Air Force officer, and he became especially enamored of the Marine Corps version of close air support. Owing to his close relationship with MacArthur, he proved singularly troublesome in the matter of command and control of air assets.

MacArthur was Commander in Chief, Far East (CINCFE) and, as such, exercised unified command of all U.S. forces in his area. Theoretically, under the unified command concept, his Far East Command (FEC) headquarters (known as GHQ) included staff representation from all the services. As was his wont however, MacArthur preferred to do things his way. FEC remained almost wholly an Army-staffed headquarters, and MacArthur never established an Army component command. Thus, instead of taking a joint, unified view of operations in MacArthur's area of responsibility, FEC tended to look at things through olive-drab eyes.

Not until Gen. Mark Clark took over as CINCFE and as Commander in Chief, United Nations Command in 1952 were steps taken to make FEC a true unified command. GHQ was dismantled and an Army component command finally established. Clark's staff eventually consisted of 91 Army, 48 Air Force, and 41 Navy officers. Unfortunately, this unified staff became opera-

tional only on January 1, 1953, just six months before the end of the war.[5]

Two component commands, FEAF and Naval Forces Far East (NAVFE), were established under FEC. As a sop to "jointness," MacArthur declared that the chiefs of staff of FEC's components would meet weekly with General Almond, the FEC chief of staff, to discuss "coordination of interservice matters."[6] But as far as the Air Force knew, this "mysterious group . . . never formally met."[7] In reality, the extent of FEAF's participation on the FEC staff was limited primarily to two or three officers who were members of FEC's Joint Strategic Plans and Operations Group.

Concurrently, Vice Adm. C. Turner Joy's NAVFE command was strapped for personnel and equipment, as were all of the services. At the outbreak of war only about 25,000 Navy personnel were stationed in the Far East, and only one carrier from the Philippines-based Seventh Fleet was immediately available to Joy. The Admiral's resources were spread thin because the defense of Formosa, not Korean operations, remained the Seventh Fleet's primary mission. The marines too were ill prepared; few, if any, marine combat aircraft were stationed in the Far East until early August.[8]

With 1,172 aircraft assigned, FEAF was the component with the most available aircraft. Only 657, however, were available for use in Korea. Three widely spaced air forces comprised FEAF: the Thirteenth, headquartered at Clark Field; the Twentieth, at Kadena; and the Fifth, based at Nagoya. Maj. Gen. Earle E. "Pat" Partridge's Fifth Air Force would provide most of the Air Force resources used in Korea.[9] Prior to the war FEAF's primary mission had been the air defense of the FEC theater of operations. Secondarily, it was charged with maintaining "an appropriate mobile strike force" and providing "air support of operations as arranged with appropriate Army and Navy commanders."[10]

For the first days of the war FEAF aircraft were limited to their primary mission of air defense. Chafing at this restriction, Stratemeyer pleaded with MacArthur for permission to strike targets in North Korea. On June 29 MacArthur granted permission to attack north of the 38th parallel, but he emphasized that these attacks were to stay well clear of the Soviet and Manchurian borders. However, the general had neither presidential nor JCS authorization for the action. The JCS finally authorized such attacks the next day, but this was not the last time MacArthur made a major decision without consulting either the President or the JCS.

The first strike north of the 38th parallel, an eighteen-plane effort against the main Pyongyang military airfield, came just hours after receipt of MacArthur's authorization. Within a few days the North Korean Air Force ceased to be an effective force, being reduced to nuisance-style raids. With little effort, FEAF had gained air superiority.

For Stratemeyer, obtaining another kind of superiority—the matter of who controlled the air units—proved fruitless. The issue came to a head when

Navy aircraft flew their first combat missions in attacks on Pyongyang on July 3 and 4. Although FEAF knew about the July 3 strikes, it was initially unaware that the Navy also intended to attack the following day. FEAF had planned a B–29 attack on the same target for the same day. When it learned of the Navy's intentions, FEAF had to cancel the B–29 mission.

Stratemeyer was incensed by the Navy's actions, particularly when a Navy representative briefed MacArthur, Stratemeyer, and some visiting Army and Air Force generals on the attacks. Stratemeyer wrote in his diary that the "results as reported by the Navy representative [are such that] anyone who attended that briefing might be led to believe that the Navy was winning the air war in Korea. It is my opinion that it was deliberately done because of the visiting group from HQ USAF and the Department of the Army."[11] Staffers at GHQ who wished to run the air show from Tokyo also interfered with Stratemeyer's air operations. General Almond was a particular offender. Initially he ordered that all requests for air support had to go through GHQ before being passed on to FEAF and Fifth Air Force. Stratemeyer strongly objected to this slow, laborious, and utterly inefficient way of running air operations in Korea. On this matter, MacArthur sided with his air commander. Later however, as X Corps commander, Almond continued to meddle in tactical air operations.[12]

The FEAF leader was less fortunate when he attempted to gain operational control of Navy and Marine Corps air assets. On July 8 he wrote to MacArthur seeking such approval stating, "in order that proper coordination can be maintained . . . , I must be able to direct their [Navy and Marine Corps] operations, including the targets to be hit and the area in which they must operate."[13]

Admiral Joy considered Stratemeyer's move as an example of "Air Force imperialism" and an attempt to control carrier operations.[14] Stratemeyer's efforts to allay his Navy counterpart's concerns by modifying his position to mean "the authority to designate the type of mission, such as air defense, close support of ground forces, etc., and to specify the operational details such as targets, times over targets, degree of effort, etc, within the capabilities of the forces involved" met with the same cold shoulder.[15]

Attempting to break this impasse, Stratemeyer, Joy, and Almond met on July 11 to thrash out a solution. Almond proposed a compromise that, if not completely satisfying to both sides, at least mollified them. Almond's compromise read in part:

> Commanding General, FEAF, will have command or operational control of all aircraft operating in the execution of Far East Air Forces mission as assigned by Commander-in-Chief, Far East. This includes operational control of naval land-based air when not in execution of naval missions which include naval reconnaissance, anti-submarine warfare, and support of naval tasks such as

> an amphibious assault.
>
> Commander, U.S. Naval Forces, Far East, will have command or operational control of all aircraft in execution of missions assigned by Commander-in-Chief, Far East, to Naval Forces, Far East.[16]

Those present at the meeting seemed to think that the statement met most of FEAF's and NAVFE's objections. Unfortunately, this compromise contained other provisions that only further muddied the water. Under the heading "Coordination" the directive stated:

> Basic selection and priority of target areas will be accomplished by the GHQ target analysis group with all services participating.
>
> Tasks assigned by CINCFE, such as amphibious assault, will prescribe the coordination by designation of specific areas of operation.
>
> When both Naval Forces, Far East, and Far East Air Forces are assigned missions in Korea, coordination control, a Commander-in-Chief, Far East, prerogative, is delegated to Commanding General, Far East Air Forces.[17]

MacArthur established a GHQ Target Group to select targets in Korea. Initially it was composed of four relatively junior officers from GHQ's G–2 and G–3 sections and of Air Force and Navy members from the Joint Strategic Plans and Operations Group. This party had broad powers, including the authority to select targets well behind the front lines and to advise on the "employment of Navy and Air Force offensive airpower in conformity with the day-to-day situation."[18]

Seeing the Target Group as another attempt to limit his control over air operations, Stratemeyer complained to MacArthur. Stratemeyer proposed that requests for air strikes, rather than going to FEC headquarters, instead be funneled through Partridge, who had established a Joint Operations Center (JOC) adjacent to Eighth Army headquarters. Partridge would honor such requests within his capabilities. Excess requests would go directly to Stratemeyer who would then work out details of air attacks with his tactical and strategic forces.[19] MacArthur agreed but reserved the right, based on recommendations of the GHQ Target Group, to direct B–29 attacks against general air support or strategic targets.

Problems concerning target selection quickly surfaced. The Target Group had little comprehension about proper targeting. The official Air Force history later recorded that "of a total of 220 targets designated by the group,

some 20 percent of the objectives did not exist."[20] The poor showing could be blamed upon the use of obsolete maps, misreading of these maps, and a failure to consult with the many available intelligence sources.

The underlying cause of the targeting problem was obvious to General Weyland, then the FEAF vice commander for operations. GHQ was not a joint staff and thus could not employ air power efficiently. Then too, the Target Group did not have the experience or the rank to perform its duties properly. Weyland proposed that a senior GHQ target selection committee, composed of general officers, make all target recommendations based on the legwork of the GHQ Target Group and FEAF's own target section. Such a group, the FEC Target Selection Committee, was formed, but it lasted only six weeks. Admiral Joy refused to name a Navy member to the committee, stating that Formosa remained the priority mission and that General MacArthur was responsible for decisions to commit the Seventh Fleet's aircraft against Korean targets. The demise of the committee was preceded by that of the GHQ Target Group, which closed shop around August 2, leaving only FEAF's own Formal Target Committee composed of FEAF operations and intelligence personnel and representatives from Fifth Air Force and FEAF Bomber Command. For the remainder of the war this group acted as the theater agency for target selection.[21]

Although target selection was eventually resolved to almost everyone's satisfaction, the matter of control of air assets remained the chimera that exasperated Stratemeyer and Weyland throughout the war. The FEC directive did not explain "coordination control," nor was any definition provided until much later in the war when a GHQ staff officer prepared an unofficial statement:

> Coordination control is the authority to prescribe methods and procedures to effect coordination in the operations of air elements of two or more forces operating in the same area. It comprises basically the authority to disapprove operations of one force which might interfere with the operations of another force and to coordinate air efforts of the major FEC commands by such means as prescribing boundaries between operating areas, time of operations in areas and measures of identification between air elements.[22]

General MacArthur evidently attached little importance to FEAF's and NAVFE's concerns for he never clarified the directive's somewhat disingenuous statements, and apparently never intended to.

Stratemeyer revisited the matter of coordination control during the planning for the Inchon landings. On September 4 he sent MacArthur proposed revisions to the air annex of the Inchon operations order, repeating his insistence that he, as Commanding General, FEAF, had to maintain coordination control over all air assets.[23] A few days later FEAF received from Almond a

letter stating that Stratemeyer's objections were noted but were not vital to the operation. All commanders had previously approved the air annex, the letter continued, and it was too late to amend the plan.[24]

The day of Almond's reply but before Stratemeyer had read it, the FEAF commander visited MacArthur to register his complaints. During this meeting Stratemeyer again insisted that "someone must control all air effort in Korea and that individual is I."[25] MacArthur agreed to Stratemeyer's points, as the FEAF leader recorded in his diary. MacArthur had made Stratemeyer "responsible for coordination control" and told him, "Why, of course, Strat, there is no other way to do it."[26] MacArthur was, however, a master at telling subordinates one thing and doing the opposite. Stratemeyer, rather sycophantic in his relations with his boss, tended to take the general's word without question, this being one example. To Stratemeyer's distress, despite MacArthur's presumed support, the matter was never satisfactorily resolved.

The success of the Inchon landings led to predictable mischievousness as the Air Force and Navy (and Almond) placed their own "spin" on how the air units had performed. Almond's X Corps had the almost exclusive service of the 1st Marine Air Wing during the landings. Now he wished to have such support, and more, all of the time. But FEAF and the Fifth Air Force were unable to comply and repeatedly turned down his requests for air support. As a result Almond became an even more fervent supporter of the marine style of close air support and his meddling continued to have a baleful effect on air affairs, an effect that senior Air Force leadership in Korea spent an inordinate amount of time combating.

Although Stratemeyer and Weyland were responsible for most air operations (the Navy being a special case), they delegated tactical control to the Fifth Air Force. In turn, General Partridge established, and his successors continued, a JOC to coordinate air-ground operations. (Even before the war, after seeing disastrous results in some joint exercises, Partridge had agitated for such a center but had been turned down by MacArthur.)[27] The center was located next to the Eighth Army headquarters. At first the title "Joint Operations Center" was a misnomer. The JOC was almost entirely Air Force–manned; Eighth Army was unable to supply many people to staff the facility. Eventually enough personnel from both services were assigned to the JOC for it to merit a multiservice designation.

A completely different situation pertained to the Navy. Admiral Joy viewed the JOC as a cumbersome, inefficient method of controlling air operations, which also impinged on the Navy's prerogatives to control its own aircraft. He thus refused to assign naval personnel as integral members of the JOC, although he assigned a permanent liaison officer whose function was to forward to Task Force (TF) 77 the JOC's mission requirements and, in turn, inform the JOC of available Navy aircraft. He had no authority to commit any aircraft to any mission.[28] This arrangement continued until almost the end of

the war. In late June 1953 the Navy finally provided the JOC with personnel who could select targets for naval aircraft in support of Eighth Army and who could ensure an effective coordination of TF–77 and Fifth Air Force aircraft. At last the JOC was truly a *joint* operation.[29]

In addition to its rigid insistence that FEC and FEAF should leave it alone, the Navy harbored serious doubts about the efficacy of the JOC's communications. In fact Navy and Air Force communications philosophies and equipment were highly incompatible. Naval forces normally operated under prebriefed orders, thus their messages tended to be relatively short. Also, since space aboard ships was tight, communications equipment was not usually large in size or capability. On the other hand, because space was not normally a problem and because message traffic was more widespread, Air Force communications were generally elaborate, in both size and capability. Too often, long Air Force messages overloaded Navy radio circuits, causing delays or cancellations of missions.[30] Ironically, more than forty years later during the Gulf War, similar communications difficulties resurfaced as Navy units were unable to properly receive the long, daily Air Tasking Orders.

In contrast to the Navy, C^2 relations with Marine Corps aviation units worked surprisingly well. Most Marine Corps aircraft were land-based and tied therefore into the JOC's communications net. General Partridge also realized the 1st Marine Air Wing's unique capabilities and gave it great leeway within the overall confines of Fifth Air Force's C^2 procedures.[31]

Where command and control worked at all during the Korean War is owed perhaps more to personalities working toward a common goal than to any institutional doctrine. The poisonous debates on roles and missions kept the services from working together to formulate effective joint C^2 policies and procedures. The hemorrhaging of the services' fiscal resources as their budgets were slashed after World War II exacerbated the situation. Until late in the war the most serious problem to affect C^2 lay at the CINCFE level. MacArthur's command was an Army, not a joint, command. Because the other services had little representation on his staff, they would cooperate or coordinate activities at their own discretion. Thus unity of command was mangled, and needless disputes arose that threatened to disrupt the proper conduct of actions to be taken against the enemy.

Sadly, command and control, as exemplified by the term "coordination control" (an oxymoron if there ever was one), was a chimera—both the mirage and the monstrosity of the Korean War.

Notes

1. Greg Todd, "C[1] Catharsis," *Army*, Feb 1986, p 14, as quoted in Thomas P. Coakley, *Command and Control for War and Peace* (Washington: National Defense University Press, 1992), pp. 9–10.
2. James A. Winnefeld and Dana J. Johnson, *Command and Control of Joint Air Operations*, RAND Study R–4045–RC (Santa Monica, Calif.: RAND, 1991), p. 6.
3. *Ibid.,* p. 7.
4. *Ibid.,* p. 8.
5. Timothy R. Keck, *Unity of Command and the Role of the Air Component Commander in the Pacific, 1941–1989* (Hickam AFB, Hawaii: Office of PACAF History, Feb 26, 1990), p. 32. This document is classified Secret. Information used is unclassified.
6. *Ibid.,* p. 31.
7. *Ibid.*
8. James A. Field, Jr., *History of United States Naval Operations: Korea* (Washington: Department of the Navy, 1962), pp. 47–48.
9. Robert F. Futrell, *The United States Air Force in Korea, 1950–1953* (Washington: Office of Air Force History, 1983), pp. 2–4.
10. *Ibid.,* p. 2.
11. William T. Y'Blood, ed., *The Three Wars of Lt. Gen. George E. Stratemeyer: His Korean War Diary* (Washington: Air Force History & Museums Program, 1999), pp. 53–55.
12. Futrell, *United States Air Force in Korea,* pp. 45, 48.
13. *Stratemeyer Diary*, pp. 57–59.
14. Field, p. 389.
15. Futrell, *United States Air Force in Korea,* p. 50.
16. *Stratemeyer Diary,* pp. 164–168.
17. *Ibid*.
18. Futrell, *United States Air Force in Korea,* p. 51.
19. *Ibid*.
20. *Ibid.,* p. 52.
21. *Ibid.,* pp. 53–55, 501–504.
22. Robert F. Futrell, *United States Air Force Operations in the Korean Conflict, 25 June–1 November 1950*, USAF Historical Study No. 71 (Washington: Office of Air Force History, 1951), p. 12.
23. *Stratemeyer Diary,* pp. 164–168.
24. Futrell, *United States Air Force in Korea,* p. 151.
25. *Stratemeyer Diary,* pp. 179–181.
26. *Ibid.*
27. Futrell, USAF Hist Study No. 71, pp. 61, 78.
28. Winnefeld and Johnson, pp. 29–30.
29. Futrell, *United States Air Force in Korea,* pp. 676–677.
30. Winnefeld and Johnson, p. 37.
31. Futrell, *United States Air Force in Korea,* p. 342.

A Different Air Force: War and Change from Vietnam to Bosnia

Wayne Thompson

In the thirty years from the onset of Operation Rolling Thunder over North Vietnam in 1965 to Operation Deliberate Force over Bosnia in 1995, the U.S. Air Force underwent a remarkable transformation. The Air Force that dropped a few hundred guided bombs in Bosnia was less than half the size of the Air Force that dropped six million tons of bombs in Southeast Asia. Improvement in guided bombing was the most influential, but not the only outcome of air power's increasingly sophisticated technology. While technology had advanced, people and politics had also changed. A leadership shaped in World War II gave way to one tempered by Vietnam. The dominance of the Strategic Air Command gave way to an Air Force with fighter pilots in charge—an Air Force without a Strategic Air Command. The central tension of the Cold War with the Soviet Union gave way to local warfare disconnected from great power rivalry. An overwhelmingly white male Air Force with wives at home gave way to a more diverse force; black officers grew in number and a few rose to the highest ranks, while some women flew planes and more repaired them.

It is easier to list such changes than to assess their significance. Should we view the Air Force of today as an essentially different institution from the one that entered the Vietnam War? Or should we note familiar themes sounded in ongoing interservice competition over the budget, and conclude that the more things change the more they remain the same?

During this fiftieth anniversary year, Air Force leaders frequently invoke the names of forebears who won the service's independence. Some of this is dry ritual, but some of it reveals a real feeling of kinship. When he speaks about "Billy" Mitchell or "Hap" Arnold, Gen. Ronald Fogleman (the Chief of Staff) displays an unmistakable emotional connection as well as humor. In one recent talk, General Fogleman paid tribute to Gen. Curtis LeMay for bringing Gen. "Benny" Foulois out of forgotten penury, housing him on Andrews Air Force Base, and sending him around the Air Force to tell the story of the service's roots. In this way Cadet Fogleman met General Foulois at the Air Force Academy.[1]

In another example filled with some ironies, Gen. George Butler, last commander of the Strategic Air Command, has often paid tribute to General LeMay as the man who built the command Butler dismantled. General Butler likes to show a photograph of Cadet Butler and General LeMay at the Air Force Academy. Since he died in the fall of 1990, a few months before Butler took command at Omaha, we cannot know how LeMay would have reacted to the end of the Strategic Air Command or Butler's subsequent personal campaign against nuclear weapons. But most observers would agree that in LeMay and Butler we have men shaped by very different experiences. The triumphant devastation of World War II refracted LeMay's gruff taciturnity, while the ambivalence of Vietnam pervaded Butler's cerebral warmth. To the extent that these men are emblematic of their service, we may conclude that a profound change has occurred.[2]

General LeMay and his generation were acquainted with violent death on a scale that made nuclear weapons seem less a revolutionary than an incremental development. A few months before two atom bombs destroyed Hiroshima and Nagasaki, a night of fire-bombing wreaked comparable devastation on Tokyo. Although most air raids into Japan and Germany had been far less efficiently destructive, the cumulative damage on the ground was severe, and the cost in planes and aircrews, very high. American airmen died at a rate almost inconceivable to those whose combat experience came later. The Army Air Forces lost more than 40,000 killed in action during World War II, and nearly as many in accidents—compared to fewer than 3,000 Air Force deaths in the Vietnam War, 35 in the Gulf War, and none in Bosnia.[3]

In Vietnam and since, most Air Force commanders and aircrews have put more emphasis on aircrew survival than target destruction. Thanks to the development of guided bombing, electronic warfare, and stealth, it is now possible to hit targets routinely and come home safely. But early in the bombardment of North Vietnam, the Air Force attempted to achieve accuracy with dive bombing, which can only be accomplished by flying low enough to encounter considerable antiaircraft fire. Air Force commanders sensibly told pilots to pull out high enough to save themselves, even though they were too high to bomb very accurately.[4]

In recent years combat flying has proved considerably less dangerous than flight training used to be. When Stuart Symington, the first Secretary of the Air Force, criticized the first Chief of Staff, Gen. Carl Spaatz, for his lack of emotion at a pilot's funeral, Spaatz angrily retorted that his whole life had been one long attendance at the funerals of his friends.[5] That grim duty is now endured much less frequently by Air Force pilots. Indeed even the traditional wide disparity in risk between aircrew and ground crew is diminishing. Last June, a terrorist truck-bombing of quarters in Dhahran, Saudi Arabia, killed nearly as many Air Force people as the entire Gulf War did, and it wounded many more.[6]

The decline in aircrew losses has also contributed to a decline in glamour. Since airline travel has become nearly as common as a bus ride (possibly more common) and with no more appeal (possibly less), the thrill of flying is less obvious. Nor does the pilot's life on the ground seem quite as alluring as it once did. Men based in Southeast Asia (especially Thailand) during the Vietnam War had ample opportunity to sample exotic delights, with a consequent upsurge in venereal disease. The experience in Southwest Asia has been far different, with the presence of a significant proportion of uniformed women in an American military force largely isolated from the local culture.

For operations over Bosnia, the Air Force has returned to an environment offering plenty of interaction with local people, in this case the Italian communities around the principal base at Aviano. But much like stateside bases, Aviano is dominated by military family life. Married military personnel bring their spouses and children; some singles bring parents. Aircrews have returned from a combat mission to sit down to a family meal. Single men on base pursue their normal interests, usually with deference to the fact that women at the club bar may be military or married or both.

Whatever else goes on at Air Force club bars, per capita consumption of alcohol appears to have declined. Heavy drinking in public is no longer as acceptable as it was in the days when a drinking problem did not necessarily block promotion to high rank. A more restrained lifestyle parallels a cautious approach to career advancement. Many fear that any mistake can destroy a career, so they avoid risk-taking and any real responsibility. Meanwhile they are careful to fill all the squares necessary to promotion. Square-filling is not all bad, and it is probably true that we have a more disciplined and better educated force as a result. At the beginning of the Vietnam War, only about half of Air Force officers had a college degree. Now the bachelor's degree is a minimum, and some sort of master's degree is usually necessary for promotion to general officer. Graduation from a war college and a joint assignment are other tickets that should be punched.[7]

The promotion system that encourages a superficial sameness can still be spiced by the vagaries of war and peace. An officer who happened to be at the right place when the Gulf War erupted, for example, could have his career turned around. Brig. Gen. Buster Glosson had just begun what might have been a quiet tour in the Persian Gulf when Iraq invaded Kuwait. Already well acquainted with Lt. Gen. Charles Horner, the senior Air Force general sent to the theater, Glosson became chief planner and fighter commander. Two more stars came his way in a couple of years before he was forced to resign amid allegations that he had tried to influence a promotion board. In the end his career offered another cautionary tale about playing by the rules and avoiding controversy.[8]

An even more publicized departure from the active duty Air Force occurred just as Glosson was beginning his ascent in the fall of 1990. During

a visit to Saudi Arabia, the new Air Force Chief of Staff, Gen. Michael Dugan, talked to newsmen about a possible bombing campaign against Saddam Hussein's regime. In demanding Dugan's resignation, Secretary of Defense Richard Cheney seemed more concerned about the general's suggestion that air power might win the war on its own than about any security breach. There was little precedent for Cheney's action. President Harry Truman's sacking of Gen. Douglas MacArthur during the Korean War came after a far more serious challenge to presidential authority.[9]

Most public controversy over Air Force officers since the Vietnam War has involved only rule-breaking or perceived incompetence rather than opinions at variance with the military or political mainstream. The service may revere the open rebellion of Brig. Gen. "Billy" Mitchell and other early air leaders, but intellectual and political ferment usually has been less evident since then. Nevertheless, a few post-Vietnam Air Force reputations were built on advocacy. Col. John Warden has been a highly controversial proponent of air power. Sparks flying from his encounters with his critics have illuminated the changing contours of the Air Force.[10]

Colonel Warden was one of many who came away from the Vietnam War looking for better ways to use air power, and his advocacy of air campaigns independent of ground operations figured prominently in the genesis of 1991's Desert Storm air campaign against Iraq. To some observers, all the fuss over Warden's ideas seemed puzzling. Much of what he said echoed strategic bombing advocates of World War II, and most airmen familiar with Rolling Thunder shared his contempt for the gradual employment of air power in North Vietnam. But there was a countervailing legacy of that war—a war in which American air power had been expended lavishly to support ground forces in South Vietnam. Those operations left a vast reservoir of experience employing air in close cooperation with the Army. When the American military refocused on Europe in the 1970s and 1980s, Army plans to use air power under the rubric of "AirLand Battle" meshed with an increasing emphasis on joint and combined operations.[11]

Warden disliked the fact that so much of the energy of Tactical Air Command (with its headquarters at Langley Air Force Base, Virginia) was dedicated to improving air support for the AirLand Battle theory being developed by the Army's Training and Doctrine Command (with headquarters at nearby Fort Monroe). He was also distressed by the Strategic Air Command's equating *strategic* with *nuclear.* As a fighter pilot, he argued that fighter aircraft should drop conventional bombs on strategic targets.

Warden thought that the guided bombing capability which the Air Force had been developing since the Vietnam War could permit air power to win a war before ground forces engaged. In the final five years of American combat in Southeast Asia, the Air Force had expended nearly 30,000 laser-guided bombs, but only in 1972 was a laser-targeting system available that could be

used in the face of heavy air defenses. Housed in a pod mounted under the wing, this system permitted the F–4 carrying it to maneuver while designating a target. Only six of these pods were available in the spring of 1972, and only four by midsummer. The Seventh Air Force commander, Gen. John Vogt, sent large formations into North Vietnam to protect the F–4s carrying the precious laser target-designation pods.[12] By 1991, the Air Force could call upon about a hundred aircraft with laser-targeting systems capable of guiding bombs in a high-threat area, and these systems used infrared technology to make laser-guided bombing as effective at night as in daylight. Indeed more so, because the new F–117 stealth fighter could penetrate alone and pose a significant problem for enemy air defenses at night even before dropping guided bombs to cripple them.

Since most unguided bombs missed their targets, it had been necessary in past wars to employ many aircraft to destroy each target. Guided bombing promised to reduce that requirement dramatically and free planes to hit more targets. Damaging numerous widely scattered targets on opening night had become feasible. For an air campaign against Iraq, Warden and his Checkmate staff in the Pentagon returned to traditional target sets like oil refineries and electrical power plants, but the great accuracy available permitted them to think in terms of taking down an electrical power grid in a few hours or days. Warden even considered disabling systems in ways that would permit their rapid repair after the short air war he envisioned.

Although his Instant Thunder plan for bombing Iraq was a reaction to the gradualism of Rolling Thunder operations in North Vietnam, Warden had internalized the determination to avoid civilian casualties imposed by the Johnson administration in the earlier war. Not only was he enamored of the logic of precision which counted as waste any bomb that did not hit a target, he also saw the Iraqi people as potential allies against Saddam Hussein. Warden thought that Saddam would be overthrown once his leadership apparatus had been severely damaged by bombing. Saddam proved to have a strong hold on Iraq, however, and the U.S. Air Force found that precision is not enough if the attacker does not know where key targets are located. Saddam and much of his weapons-producing capability survived the war.[13]

Unlike Warden's original plan, Desert Storm emphasized unprecedented destruction of the Iraqi army's tanks, artillery, and ammunition before a coalition ground offensive. Warden himself contributed to this shift in emphasis Indeed, he was delighted by "tank plinking"—the employment of 500-pound guided bombs against tanks—so long as that job was left to F–111s and F–15Es while F–117s continued to bomb targets in Baghdad and elsewhere in Iraq.

Vivid televised coverage of precision bombing in Southwest Asia submerged older depictions of urban area bombing in World War II and napalm in Vietnam. If the new images fostered public belief in the success of air power,

they also promoted a demand for low casualties among enemy civilians and even troops. Yet the public learned much less about B–52 area bombing of Iraqi troop positions in the desert, not to mention B–52 raids on the large Taji military complex near Baghdad.

While fewer than ten percent of the bombs dropped in Desert Storm were guided, less than five years later a much smaller Operation Deliberate Force in Bosnia mostly expended guided bombs. Indeed, allies who lacked guided bombing capability dropped almost all the unguided bombs. Even in the case of guided bombs, the international context of Bosnian operations argued against destroying major targets. Warden's notion of quickly striking all important targets was discarded in favor of a more cautious approach which put the highest priority on the avoidance of civilian and military casualties.[14]

The North Atlantic Treaty Organization's air commander in Italy, the U.S. Air Force's Lt. Gen. Michael Ryan (who had served in the Vietnam War when his father commanded Pacific Air Forces), personally approved aiming points for all bombs to be used. He feared that collateral damage might lead to an outcry which would abort the campaign. His concern paid off, and this very limited bombing campaign was enough (in conjunction with Croatian and Muslim ground offensives) to bring Bosnian Serbs to a cease-fire. If, on the other hand, the Bosnian Serbs had persisted, the United Nations and the North Atlantic Treaty Organization would have been left to debate whether to proceed with a gradual escalation of the air war. We have a very different Air Force than the one which entered the Vietnam War, but it is not necessarily an Air Force which has seen the last of gradualism.

The Air Force's recent experience drives it toward more guided bombing, and the technology is improving so that even bad weather will cease to be the impediment it has been. We should not be too eager, however, to announce the death of area bombing, even urban area bombing. We live in a world where the employment of missiles with nuclear, chemical, or biological warheads is a dangerous possibility. Yet today's Air Force seeks to solve this problem with precision rather than with the threat of retaliation in kind.

Notes

1. Gen. Ronald R. Fogleman, talk at the National Air and Space Museum, Mar 13, 1997.

2. Gen. Butler spoke at a banquet honoring Gen. LeMay, Bolling Air Force Base, May 16, 1993; Butler spoke on his role in terminating the Strategic Air Command at an Air Force Historical Foundation symposium, Andrews Air Force Base, Sep 18, 1992; Butler's "The General's Bombshell: What Happened When I Called for Phasing Out the U.S. Nuclear Arsenal" appeared in the *Washington Post* on Jan 12, 1997.

3. Army Air Forces casualties in World War II included more than 25,000 killed in aircraft accidents. Of the thirty-five USAF personnel who died in the Gulf War, twenty were killed in action.

4. By 1967 Air Force pilots attacking targets in Route Package VI, North Vietnam, were supposed to pull up above 6,000 feet.

5. This story was recounted at a conference by Dr. David Mets based on an interview with Symington. See Wayne Thompson, ed., *Air Leadership,* Proceedings of a Conference at Bolling Air Force Base, April 13–14, 1984 (Washington, 1986), p. 49.

6. The Dhahran truck-bombing killed nineteen USAF people (seventeen enlisted and two officer) and seriously wounded about twice that many others. In the Gulf War, thirty-five Air Force people died (twenty-two officers and thirteen enlisted) of which twenty were killed in action; only nine others were wounded. Perry Jamieson of the Air Force History Support Office is writing a study of the Air Force response to the Dhahran truck-bombing.

7. On the transition to a college-educated officer corps, see Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944–1974* (Washington, 1996), especially pp. 197–201. On the more free-wheeling style of fighter pilots in the 1950s, see John Darrell Sherwood, *Officers in Flight Suits: The Story of American Air Force Fighter Pilots in the Korean War* (New York, 1996). By then Gen. LeMay had already brought a more disciplined approach to the Strategic Air Command, and subsequently his disciples spread LeMay's approach through the Air Force. The increasingly cautious lifestyle of Air Force officers was paralleled by changes in the lifestyle of the enlisted force; see Janet R. Bednarek, ed., *The Enlisted Experience: A Conversation with the Chief Master Sergeants of the Air Force* (Washington, 1995), especially pp. 148–149.

8. See, for example, John Lancaster and Barton Gellman, "Air Force Reprimands Deputy Chief for Meddling in Promotion Process," *Washington Post*, Dec 4, 1993. The most extensive coverage of this affair was in the *Air Force Times*, especially Mar 28 and Jul 18, 1994.

9. Michael R. Gordon and Gen. Bernard E. Trainor give a summary of the Dugan affair in *The Generals' War* (Boston, 1995), pp. 100–101.

10. Most books on the Gulf War discuss Col. John A. Warden III. See, for example, the book by Gordon and Trainor cited in the previous note. The current Chief of Staff of the Air Force, Gen. Ronald Fogleman, has included Col. Richard T. Reynolds' *Heart of the Storm: The Genesis of the Air Campaign Against Iraq* (Maxwell AFB, Ala., 1995) on his recommended reading list; see also the companion volume by Col. Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates* (Maxwell AFB, Ala., 1995). The second volume of the *Gulf War Air Power Survey* (Washington, 1993) has a report on planning by Alexander Cochran *et al.* The most thorough history of planning for the Gulf War air campaign is a classified manuscript by Diane Putney of the Air Force History Support Office. Warden's own book, *The Air Campaign: Planning for Combat* (Washington, 1988), preceded the Gulf War and does not fully reflect his thinking at the time of the war. This author formed his impressions of Warden while working in Warden's Checkmate planning group during the Gulf War.

11. A good introduction to Air Force involvement in AirLand Battle preparations is Richard G. Davis, *The 31 Initiatives* (Washington, 1987).

12. Considerable insight into Vogt's experience with guided bombing can be gained from the interview he gave to Lt. Col. Arthur W. McCants, Jr., and Dr. James C. Hasdorff of the Air Force history program, Aug 8–9, 1978.

13. See the author's "After Al Firdos: The Last Two Weeks of Strategic Bombing in Desert Storm," *Air Power History*, Summer 1996, pp. 48–65.

14. The author's impressions of Deliberate Force are drawn primarily from his interviews with American aircrews, commanders, planners and intelligence officers in Italy shortly after the operation.